

# Heavy neutrino production at the FCC-ee: Dirac or Majorana?

*Tuesday, August 2, 2022 3:00 PM (30 minutes)*

Three mysteries stand after the discovery of the Higgs boson: (i) the origin of the masses of the neutrinos; (ii) the origin of the baryon asymmetry in the universe; and (iii) the nature of dark matter. The FCC-ee provides an exciting opportunity to resolve these mysteries with the discovery of heavy neutral leptons (HNLs), in particular using the large sample ( $5 \cdot 10^{12}$ ) Z bosons produced in early running at the Z resonance using the production process  $e^+e^- \rightarrow Z \rightarrow \nu N$ . The expected very small mixing between light and heavy neutrinos leads to very small mixing angles, resulting in very long lifetimes for the HNL and in spectacular signal topology. Although the final state in this reaction appears to be charge-insensitive, it is nevertheless possible to distinguish the Dirac vs Majorana nature of the neutrinos, by a variety of methods that will be discussed. A Majorana nature could have considerable implication for the generation of the Baryon Asymmetry of the Universe.

## Attendance type

In-person presentation

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**Session Classification:** WG5: Beyond PMNS

**Track Classification:** WG5: Beyond PMNS